IN THE CLAIMS

Please amend the claims as follows:

1. (Previously Presented): A plasma immersion ion implant apparatus comprising:

a plasma chamber configured to receive a process gas;

a radio frequency (RF) source configured to generate RF current ;

an RF antenna unit including an active antenna and a parasitic antenna, the active antenna surrounding the plasma chamber, including a first end electrically coupled to the RF source to receive the RF current from the RF source, and including a second end coupled to ground, the parasitic antenna surrounding the plasma chamber, wherein the parasitic antenna is not electrically coupled to the RF source; and

a platen configured to hold a target,

wherein each antenna of the RF antenna unit resonates RF current and induces electro-magnetic field that is effective to pass into the plasma chamber and that excites and ionizes the process gas to generate a plasma within the plasma chamber, the plasma comprising ions.

2. (Original): The apparatus of claim 1, wherein the active antenna includes a horizontally-extending coil and the parasitic antenna includes a vertically-extending coil.

3. (Original): The apparatus of claim 1, wherein the active antenna includes a vertically-extending coil and the parasitic antenna includes a horizontally-extending coil.

4. (Original): The apparatus of claim 1, wherein the parasitic antenna includes a plurality of turns with one end grounded.

5. (Cancelled)

6. (Withdrawn): The apparatus of claim 1, wherein the parasitic antenna includes a plurality of turns with both ends floating.

7. (Previously Presented): The apparatus of claim 1, wherein one of the active and parasitic antennas of the RF antenna unit is a horizontally extending coil having a plurality of windings and wherein a diameter of innermost winding of the horizontally extending coil in a lateral direction is greater than a size of the target in the lateral direction.

8. (Original): The apparatus of claim 1, wherein the parasitic antenna is above and coaxial with the active antenna.

9. (Original): The apparatus of claim 1, wherein at least one antenna is liquid cooled.

10. (Cancelled)

11. (Original): The apparatus of claim 1, wherein the plasma chamber includes:

a horizontal planar section positioned above the platen;

a vertical cylindrical section extending from the horizontal planar section; and

a top section coupled to the vertical cylindrical section.

12. (Original): The apparatus of claim 11, wherein the horizontal planar section and vertical cylindrical section are dielectric, and the top section is conductive and grounded.

13. (Original): The apparatus of claim 12, wherein the horizontal planar section and vertical cylindrical section are formed of a high purity ceramic material.

14. (Original): The apparatus of claim 13, wherein the high purity ceramic material is >99.6% Al_2O_3, AlN, Yittria or YAG.

15. (Original): The apparatus of claim 12, wherein the top section is formed of Al.

16. (Original): The apparatus of claim 11, wherein the top section is liquid cooled.

17. (Cancelled):

18. (Original): The apparatus of claim 1, further comprising a gas source controller for maintaining a pressure of the plasma chamber at a predetermined value.

19. (Original): The apparatus of claim 1, wherein the RF source operates at a low RF frequency.

20. (Original): The apparatus of claim 19, wherein the low RF frequency is less than 27 MHz.

21. (Original): The apparatus of claim 19, wherein the low RF frequency is 400 KHz, 2 MHz, 4 MHz or 13.56 Mhz.

22-23. (Cancelled)

24. (Previously Presented): A plasma chamber comprising:

a horizontal planar dielectric section positioned above a platen;

a vertical cylindrical dielectric section contacting and extending from the horizontal planar dielectric section;

a liquid cooled top conductive section coupled to the vertical dielectric section; and

a radio frequency antenna unit including a horizontally-extending coil disposed on the horizontal planar dielectric section and a vertically-extending coil disposed on the vertical cylindrical dielectric section, wherein one of the horizontally-extending coil and the vertically-extending coil comprises an active radio frequency antenna that is electrically coupled to an RF source and other one of the horizontally-extending coil and the vertically-extending coil comprises a parasitic antenna that is not electrically coupled to the RF source, the active radio frequency antenna and the parasitic antenna of the radio frequency antenna unit inducing radio frequency current into the plasma chamber that excites and ionizes a process gas so as to generate a plasma in the plasma chamber.

25. (Original): The plasma chamber of claim 24, wherein the top conductive section is grounded.

26. (Cancelled)

27. (Previously Presented): The plasma chamber of claim 24, wherein the vertically-extending coil is the parasitic antenna that is not electrically coupled to a radio frequency (RF) source.

28. (Original): The plasma chamber of claim 27, wherein the parasitic antenna includes a plurality of turns with one end grounded.

29. (Cancelled)

30. (Previously Presented): The plasma chamber of claim 24, wherein the radio frequency antenna unit is liquid cooled.

31. (Previously Presented): The plasma chamber of claim 24, wherein the horizontally-extending coil is the active radio frequency antenna that is electrically coupled to a radio frequency (RF) source.

32. (Original): The plasma chamber of claim 24, further comprising a process gas inlet and a strike gas inlet.

33. (Previously Presented) The plasma chamber of claim 24, further comprising a platen disposed in the plasma chamber for supporting a target, wherein the horizontally-extending coil is spaced apart from the target by a first height in a vertical direction and the vertically-extending coil is spaced apart from the target by a second height in the vertical direction, the first height being less than the second height.

34. (Previously Presented) The plasma chamber of claim 24, wherein the platen is disposed in the plasma chamber for supporting a target, wherein the horizontally-extending coil has a plurality of

windings and spaced apart from the target by a height in a vertical direction, and wherein a diameter of innermost winding in a lateral direction is greater than size of the target in the lateral direction.

35. (Previously Presented) The plasma immersion ion implantation apparatus of claim 1, wherein one antenna of the RF antenna unit is a horizontally-extending coil and another one antenna of the RF antenna unit is a vertically-extending coil, each coil having a plurality of windings.

36. (Previously Presented) The plasma immersion ion implantation apparatus of claim 1 further comprising: a coil adjuster that is positioned in the parasitic antenna and that is configured to adjust a number of turns of the parasitic antenna.

37. (Cancelled)

38. (Previously Presented): A plasma immersion ion implantation apparatus comprising:

a plasma chamber configured to receive a process gas;

a radio frequency (RF) source configured to generate RF current;

an RF antenna unit including a horizontally-extending active antenna coil and a vertically extending parasitic antenna coil, the horizontally-extending active antenna coil that includes a first end coupled to the RF source to receive the RF current from the RF source, the vertically-extending parasitic antenna coil being without an electrical connection to a power source; and

a platen configured to hold a target,

wherein the vertically-extending parasitic antenna coil induces an RF current into the plasma chamber and excites and ionizes a process gas so as to generate a plasma in the plasma chamber, the plasma comprising ions.

39. (Cancelled):

40. (New) The plasma immersion ion implantation apparatus of claim 38 further comprising: a coil adjuster that is positioned in the parasitic antenna and that is configured to adjust a number of turns of the parasitic antenna